Bonneville Power AdministrationPower Administration
Fish and Wildlife Program FY99 Proposal Form

Section 1. General administrative information

Evaluate spring chinook life history-habitat relationships in the McKenzie Watershed

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Bonneville project number, if an ongoing project 9038

Business name of agency, institution or organization requesting funding
McKenzie Focus Watershed Council

Business acronym (if appropriate)

Proposal contact person or principal investigator:

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Subcontractors.

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NPPC Program Measure Number(s) which this project addresses.
2.2, 2.4A.3, 6.1, 6.1C.1

NMFS Biological Opinion Number(s) which this project addresses.

Other planning document references.

Research need is referenced in the 1998 Draft Revisions to the Oregon Department of Fish and Wildlife's McKenzie Sub-basin Fish Management Plan. This research project is supported by the McKenzie Watershed Council and (see attached letters of support)

Oregon Department of Fish and Wildlife, U.S.D.I Bureau of Land Management, and U.S.D.A. Forest Service.

Subbasin.

Willamette

Short description.

Collect information and make recommendations that allow fish and land managers and watershed councils to 1) secure the present population of wild spring chinook in the McKenzie River by protecting existing chinook habitat, and 2) increase chinook production in the future by improving habitat/environmental conditions in the basin.

Section 2. Key words

Mark	Programmatic Categories	Mark	Activities	Mark	Project Types
X	Anadromous fish		Construction	X	Watershed
	Resident fish		O & M		Biodiversity/genetics
	Wildlife		Production	+	Population dynamics
	Oceans/estuaries	X	Research	+	Ecosystems
	Climate	+	Monitoring/eval.		Flow/survival
	Other	+	Resource mgmt		Fish disease
			Planning/admin.		Supplementation
			Enforcement	+	Wildlife habitat enhancement/restoration
			Acquisitions		

Other keywords.

Life history, habitat requirements, spring chinook salmon.

Section 3. Relationships to other Bonneville projects

Project #	Project title/description	Nature of relationship
9206800	Willamette Basin Acquisition	Targets acquisition of critical fish and wildlife habitat in the Upper Willamette Basin. The proposed project will assist with identifying and prioritizing land acquisitions in the McKenzie Watershed/Willamette River confluence area

Section 4. Objectives, tasks and schedules

Objectives and tasks

No.	Objective	No.	Task
1.	Determine the current temporal and spatial use patterns of all life stages of wild spring chinook spawned in the McKenzie Basin.	1a.	Map (GIS) the location of adult holding and spawning areas. Graph the temporal distribution of spawning.
		1b.	Estimate the timing of emergence in spawning areas and relate to water temperatures.
		1c.	Map (GIS) the location and relative abundance of rearing juveniles throughout the year.
		1d.	Estimate the timing of juvenile migrations at Leaburg Dam, at the mouth, and in the mainstem Willamette.
2.	Identify the juvenile life history types that currently contribute to the production of spring chinook salmon.	2a.	Pit tag wild juvenile spring chinook at three life stages as they migrate past Leaburg Dam. Use tag recoveries at several sites down to Willamette Falls to estimate when these fish leave rearing areas.
		2b.	Determine if reference collections of scales from juveniles at several life stages can be used to identify life history contribution to wild adult returns.
3.	Identify current habitat and environmental attributes used by various life stages, particularly those attributes needed to maintain successful life history types.	3a.	Obtain current habitat and environmental data from the proposed FY99 McKenzie Watershed Assessment.
		3b.	Use GIS overlays of distribution (Obj. 1), an analysis of life history data (Obj.'s 1 & 2), and habitat data (Task 3a) to identify the habitats and environments important to spring chinook.

4.	Identify opportunities to improve habitat in existing production areas and to re-establish populations in areas historically occupied.	4a.	Use Ecosystem Diagnosis and Treatment (EDT) (Lichatowich et al. 1995) as a conceptual approach to improving/increasing habitat in the McKenzie Basin.
		4b.	Obtain historic habitat and environmental data from the proposed FY99 McKenzie Watershed Assessment.
		4c.	Describe historic life history strategies used by spring chinook in the Willamette Basin. Data will come from the literature.
		4d.	Compare current life histories and habitats with historic (healthy) life histories and habitats to identify factors that may be limiting production.
		4e.	Recommend prescriptive treatments that can be used to correct or circumvent habitat/environmental limitations.

Objective schedules and costs

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1,2	10/1998	06/2002	65%
3	01/2000	06/2002	20%
4	7/2002	6/2003	15%

Schedule constraints. Identify any constraints that may cause schedule changes.

Completion date. Enter the last year that the project is expected to require funding.
2003

Section 5. Budget

FY99 budget by line item

Project coordination by the McKenzie Watershed Coordinator will be funded through the proposed FY99 McKenzie Focus Watershed Coordination project. The following budget is for sub-contracting with ODFW.

Item	**Note**	**FY99**
Personnel	32 months EBA-1	50,760
Fringe benefits	(45%)	22,844
Supplies, materials, non-expendable property	Includes: Hobo Temps-15@$80; Hand-held Pit tag Detectors - 2@$1200; Portable Pit Tag Station-$3500.	14,620
Operations & maintenance		0
Capital acquisitions or improvements (e.g. land, buildings, major equip.)	Screw traps- 2@ 14,750$; 20 ft. sled and trailer-12,000$ (150 hp outboard with jet unit to be furnished by ODFW)	41,500
PIT tags	# of tags: 7,000	20,300
Travel		6,000
Indirect costs		26,226
Subcontracts		
Other		
TOTAL		182,250

Outyear costs

Outyear costs	**FY2000**	**FY01**	**FY02**	**FY03**
Total budget	143,589	146,104	117,628	40,019
O&M as % of total	0	0	0	0

Section 6. Abstract

This project is designed in two interrelated phases. The first phase will collect information and make recommendations that allow fish and land managers and watershed councils to secure the present population of wild spring chinook in the McKenzie River by better protecting important, existing chinook habitats. In this phase we will map current use of the river by all life stages of wild spring chinook salmon and identify the habitat/environmental conditions important in maintaining those life stages. Map overlays in a Geographic Information System (GIS) will be the analytical basis for this objective and will provide managers a visual representation of areas and habitat used by wild spring chinook salmon at any time throughout the year. Life history data will be compiled from existing information, where available, and will be collected in the field where needed. After information to secure the present population has been reported, a second phase will identify opportunities for managers and watershed councils to increase natural production of spring chinook salmon in the basin. During this phase we will describe methods and identify areas for improving habitats/environments in existing production areas. In addition, we will examine the relative value and feasibility of re-establishing production in areas used historically, primarily in those areas cutoff by dams. The Ecosystem Diagnosis and Treatment (EDT) process described by Lichatowich et al. (1995) will form the conceptual approach for phase two.

Section 7. Project description

a. Technical and/or scientific background.

The McKenzie River watershed has regional significance. The McKenzie Watershed supports anadromous and resident fish species, including spring chinook salmon and bull trout. Willamette Basin spring chinook populations have declined to the point that federal listings are under consideration (Miller et al. 1997). Historical data shows that the McKenzie River produced an estimated 40% of the run of spring chinook above Willamette Falls, but these runs have dramatically declined (Howell et al. 1988). The McKenzie Watershed now is considered the most important remaining area for the production of bull trout and native spring chinook (Ratliff and Howell 1992; Howell et al. 1988).

The McKenzie Watershed represents the best opportunity in the Willamette Basin for the long-term persistence of native spring chinook. The watershed supports continuous blocks of high-quality fish habitat. Nearly seventy percent of the watershed is in federal ownership, primarily concentrated in the upper portions of the drainage. In a recent survey, the quantity and quality of existing spring chinook spawning habitat in the upper watershed was found to be good, with little change from what was found historically (Sedell et al. 1992). Maintaining and expanding the connectivity of these areas is important to protect habitats that are large and well dispersed enough to be resilient in the face of large-scale catastrophic disturbance.

There has been loss of spring chinook habitat in the McKenzie Watershed over time, with most habitat degradation concentrated in the lower basin. However, reduced availability of some mainstem side-channel habitats and moderate channelization due to dam-related reductions in sediment and peak flows, near-channel roads, and riprapped banks has been observed in the upper forested portions of the watershed (Minear 1994). The lower McKenzie River valley (beginning at RM 40) is increasingly in urban, residential, and agricultural land uses. Historically, this portion of the watershed was characterized by an unconfined valley, dynamic channel shifts, and abundant side-channel areas. Dikes and riprapping have confined large portions of the lower river to a set channel, with dramatic decreases in hydraulic complexity, loss of large areas of side-channel habitat, and over a fifty-percent reduction in mid-channel islands (Ligon 1991). Loss of channel habitat structure, side channels, and islands reduces important chinook salmon rearing areas (McKenzie Watershed Council 1996). Much of the floodplain area in the lower valley is occupied by residences and disconnected from the active river channel due to extensive diking and riprapping.

The McKenzie Watershed Council is developing a watershed planning framework to guide its future activities. Watershed analyses and other studies have been completed in sub-watersheds covering over three-quarters of the watershed, including all federal lands and the large portion of the industrial forest land base under Weyerhaeuser ownership (Attachment A). Information from these assessments, and the scientific data and expertise gathered at the H.J. Andrews Experimental Forest, provide a rich store of information and expertise for guiding management strategies in the McKenzie Watershed. This knowledge base and advice from the Aquatic Habitat/Water Quality Task Group (Attachment B) served as the foundation for the development of action plans to prioritize watershed projects. The Council is developing a coordinated strategy for re-establishing the historic mosaic of habitats in the watershed by protecting existing high quality habitats and restoring watershed structure and function in areas where it is degraded.

More information on spring chinook life history and habitat relationships is required to maintain and enhance the native McKenzie population. It appears that loss of habitat complexity in the lower reaches is concentrating most of the juvenile rearing to the upper watershed, reducing life history opportunities. While it is certain that habitat fragmentation is restricting the expression of spring chinook life history diversity, population restoration strategies will require more information on the relationships among chinook life histories and habitat quality and connectivity. Restoration of native spring chinook in the watershed will require rebuilding productive life history-habitat relationships and conserving diverse life histories (Lichatowich et al. 1995).

b. Proposal objectives:

1. Provide map overlays (GIS), graphs, and text that describe and document the current temporal and spatial use patterns of all life stages of wild spring chinook spawned in the McKenzie Basin. Annual progress reports will be written as well as a final project report.

Hypothesis: Life stages of wild spring chinook use the McKenzie River in dynamic but predictable patterns throughout the year**.**

Assumptions: (1) A complete understanding of the life history of chinook salmon is needed to define the habitats critical to the maintenance of salmon in the McKenzie River.
(2) Easily accessible documentation including the location and function of important habitats will give fish and land managers and watershed councils the tools to protect spring chinook salmon habitats/environments.

2. Identify the juvenile life history types that currently contribute to the production of spring chinook salmon. Annual progress reports will be written as well as a final project report.

Hypothesis: Not all juvenile life histories are contributing to adult returns because of changes in habitats/environments at some point in the life cycle that do not allow fish to survive to return as adults.

Assumption: Habitat that is currently used by successful juvenile life history types are of the highest priority for managers to protect in order to secure current wild populations of spring chinook in the McKenzie River.

3. Provide map overlays (GIS), graphs, and text that describe and document current habitat and environmental attributes important to various life stages, particularly those attributes needed to maintain successful life history types. Annual progress reports will be written as well as a final project report.

Hypothesis: Important habitat and environmental attributes can be identified and described for those areas used by wild spring chinook salmon.

Assumptions: (1) Easily accessible documentation including the location and function of important habitats will give fish and land managers and watershed councils the tools to better protect spring chinook habitats/environments.
(2) Habitat that is currently used by successful juvenile life history types is the highest priority for protection.

4. Provide written recommendations on prescriptive treatments for improving habitat for spring chinook salmon and for re-establishing production in areas used historically. Annual progress reports will be written as well as a final project report.

Hypothesis: Corrective treatments of habitats and environments that provide for re-expression of historical life history diversity are most likely to be successful in increasing the production of wild spring chinook salmon in the McKenzie River. This is the underlying hypothesis of the Ecosystem Diagnosis and Treatment procedure (Lichatowich and Mobrand, 1995).

Assumptions: (1) Opportunities for increasing wild spring chinook still exist in the McKenzie and Willamette basins given current constraints and increasing population growth in the Willamette Valley.
(2) Estuary and ocean conditions have not changed permanently in a way that will limit productivity of restored life history strategies.

c. Rationale and significance to Regional Programs.

Information gained from the proposed research will provide the McKenzie Watershed Council and fish and land managers with tools that can be used to better protect and improve native spring chinook populations. Management decisions will be based upon a sound understanding of the relationships among habitat, life history, and production of McKenzie River spring chinook. Similar life history-habitat assessments using the EDT approach are being done in the Yakima and Grand Ronde watersheds. The Confederated Tribes of the Warm Springs Reservation of Oregon have just begun using this methodology to find ways of improving habitats for fish and wildlife in the Deschutes River basin (personal communication, Patty O'Toole, CTWSRO, Warm Springs, Oregon). Information from multiple watersheds will provide a more comprehensive picture of chinook life history patterns throughout the Columbia Basin.

The proposed research project will integrate with the McKenzie Watershed Assessment proposed for FY99 BPA funding. The assessment will develop and summarize information on historical habitat quality, current conditions and trends, and environmental variables. The assessment will divide the watershed into environmentally distinct reaches based upon channel geomorphology, flow patterns, thermal cycles, connectivity of habitats, and other factors. Information generated by the assessment will provide the habitat/environmental context that will be used in the life history-habitat analysis. Both projects will generate complementary information that will be used by the McKenzie Watershed Council to develop watershed-wide management strategies and to target properties for habitat protection and restoration.

e. Methods.

OBJECTIVE 1:

Task 1a. Map (GIS) the location of adult holding and spawning areas. Graph the temporal distribution of spawning. The McKenzie River mainstem and tributaries will be surveyed in July and August for 3 years to map adult holding areas. Surveys will be done by snorkeling and/or with rafts. Much of the spawning area in the McKenzie has been surveyed in the past by foot, boat, and helicopter (Grimes et al. 1996, and Lindsay et al. 1997). Some exploratory surveys will be made in September in areas not normally surveyed (e.g. the Mohawk River) to make certain all areas have been covered. Temporal distribution of spawning also has been estimated in the past (Grimes et al. 1996, and Lindsay et al. 1997). Holding and spawning area distribution will be put into GIS overlays for each year.

Task 1b. Estimate the timing of emergence in spawning areas and relate to water temperatures. Methods for estimating the beginning and ending of emergence in tributaries and the main stem will be similar to those described by Lindsay et al. (1985) in the John Day River. The beginning of emergence will be the date fry are first caught at standard sample sites throughout the basin. Ending of emergence will be estimated as the time when 5% or less of the catch consist of fry < 37mm, fork length. Rich (1920) found chinook fry range from 35 to 44 mm at emergence. Seines will be used at standard sites in tributaries once a week to capture fry. Because of its larger size, screw traps and/or the Leaburg Dam trap will be used to monitor timing in the main stem. Thermographs will be used to monitor water temperatures in spawning areas in the main stem and tributaries. Thermal units will be calculated and related to the time of emergence especially for reaches affected by flood control dams.

Task 1c. Map (GIS) the location and relative abundance of rearing juveniles throughout the year. Distribution and relative abundance of wild juveniles will be determined by establishing standard sampling stations primarily in the lower McKenzie and in the Willamette River upstream and downstream of the confluence with the McKenzie. Sampling will be conducted once a month throughout the year with a jet sled and seines. ODFW plans to mark all hatchery spring chinook released from McKenzie and Willamette river hatcheries with an adipose fin clip beginning with the 1997 brood so that hatchery and wild juveniles can be differentiated easily. Lengths will be collected and a sample of scales taken for use in Task 2a. High flows in the winter and early spring may limit the success of sampling standard sites at these times of year. Standard sites will likely change somewhat depending on stream flow. Sampling would be related to the annual escapement of adults at Leaburg Dam. Spring chinook are counted by ODFW each year at the dam with a video camera. Large differences in escapement would likely influence the annual relative abundance and distribution of juveniles. Sample sites and the data associated with those sites will be put into GIS overlays for each year.

Task 1d. Estimate the timing of juvenile migrations at Leaburg Dam, at the mouth, and in the mainstem Willamette. A juvenile trap already exists at Leaburg Dam to monitor migrations from upper-river spawning areas in the McKenzie. A screw trap would be fished in the lower McKenzie near the mouth wherever a suitable site can be located. A second screw trap would be fished in the mainstem Willamette near Corvallis to monitor migration through the Willamette River. Most wild chinook caught in the mainstem Willamette at the Corvallis site would be McKenzie fish because no wild fish are thought to occur in the Middle Fork Willamette, the only other tributary above Corvallis with a spring chinook run (hatchery fish). Juveniles also will be sampled by Enron (formerly PGE) at the Sullivan Plant at Willamette Falls in Oregon City where captured chinook can be scanned for Pit tags (Task 2b). Hand-held scanners will be used at other traps to identify Pit tagged fish in Task 2b. Traps will be fished a minimum of 4 days every 2 weeks throughout the year to monitor migration timing. Lengths will be collected and a sample of scales taken for use in Task 2a. Flood conditions with high debris loads in the winter and early spring may limit the success of sampling with screw traps during these times.

OBJECTIVE 2:

Task 2a. Pit tag wild juvenile spring chinook at three life stages as they move past Leaburg Dam and as they rear in the lower river. Use tag recoveries to document when these fish migrate from rearing areas. Pit tagging juveniles will give a direct measure of when three different life history groups actually leave rearing areas and migrate toward the ocean. This approach would compare seaward-migration timing of fry (subyearlings) that move past Leaburg Dam in spring and rear in the lower river, subyearlings that move past the dam in fall, and yearlings that migrate past the dam in spring. Because of their small size when they move past Leaburg Dam, fry would be seined and pit tagged in the lower river in summer prior to any fall migrations. Subyearlings in the fall and yearlings in the spring would be captured and tagged at Leaburg Dam as they moved downstream. Screw traps at the mouth of the McKenzie, at Corvallis, and in the Sullivan Plant bypass trap at Willamette Falls (Task 1d) would be used to recover Pit tagged fish from the three groups. We would tag 3,000 each of the spring and fall subyearlings, and 1,000 of the yearlings each year. Sample sizes were based on the estimated sampling rate of juveniles at the Sullivan Plant in average fall and spring flows, estimates of migration mortality between the McKenzie River and Willamette Falls (20%), and overwinter survival from summer to spring (Lindsay et al. 1985; personnal communication, M. Buckman, Biometrician, ODFW, Corvallis, OR).

Task 2b. Determine if reference collections of scales from juveniles at several life stages can be used to identify life history types of wild adult returns. Scale samples will be collected from juveniles (especially those Pit tagged), captured under Tasks 1c and 1d. Scales will be collected from three groups: subyearling late spring migrants, subyearling fall migrants, and yearling spring migrants. Scale patterns (circuli number, circuli spacing, and annulus formation) will be catalogued for each group. Patterns on adult scales will be compared to the juvenile reference collections to determine the life history types that are contributing to adult returns. Scales on unmarked returning adults will be sampled at Leaburg Dam fishway beginning in 2000 (all 1996 and forward hatchery broods were marked in the McKenzie). Sampling in 2000 assumes that juvenile reference collections can be used across brood years. If this assumption is not true, the first adults returning from the same brood year as the reference collections would be in 2001.

OBJECTIVE 3:

Task 3a. Obtain current habitat and environmental data from the proposed FY99 McKenzie Watershed Assessment. We will rely on other projects and completed surveys to complete this task. Data will come primarily from the FY99 McKenzie Watershed Assessment. Additional habitat surveys in tributaries of the McKenzie have been already been completed by ODFW and USFS (personal communication, Kim Jones, Aquatic Inventory Project, ODFW, Corvallis, OR).

Task 3b. Use GIS overlays of life history data from Objectives 1 & 2 and of habitat data from Task 3a to identify the habitats and environments important to spring chinook. Data from other tasks will be analyzed using GIS to compare current habitat/environmental features of the McKenzie Watershed (Task 3a) with the distribution and relative abundance of various life stages of spring chinook salmon (Objectives 1 & 2).

OBJECTIVE 4:

Task 4a. Use Ecosystem Diagnosis and Treatment (EDT) (Lichatowich et al. 1995) as a conceptual approach to improve/increase habitat in the McKenzie Basin. The Ecosystem Diagnosis and Treatment (EDT) process described by Lichatowich et al. (1995) is a conceptual approach to Objective 4. The process consists of five steps: (1) define objectives (e.g. "increase natural production"); (2) conduct a Patient-Template Analysis and Diagnosis; (3) identify treatment alternatives; (4) analyze risk; and (5) apply and evaluate treatments. Step 2, the Patient-Template Analysis, is the cornerstone of this approach. This analysis compares current life histories and habitats of a target population (Patient) with historic (healthy) life histories and habitats of that same population (Template). A diagnosis of the patient relative to the template identifies factors that may be limiting production. Where possible, prescriptive treatments can be used to correct or circumvent habitat/environmental limitations. Lichatowich et al. (1995) state: "Restoration is the return of that part of the historic habitat quality and production of salmon that is possible within existing biological and social constraints".

The EDT approach is currently being used in the Grande Ronde basin as a conceptual framework for improving conditions in that watershed (Grande Ronde Model Watershed Project; Mobrand et al. 1995). Watershed projects on the Grande Ronde and on the Yakima River in Washington (Lichatowich et al. 1995) are using the Patient-Template model to identify specific treatment activities for restoration plans. Spring chinook salmon have been chosen as an indicator or diagnostic species of watershed health for the Grande Ronde project (Mobrand et al. 1995).

Task 4b. Obtain historic habitat and environmental data from the FY99 McKenzie Watershed Assessment. We will rely on the McKenzie Watershed Assessment for a detailed description of historic habitat/environments in the McKenzie Basin.

Task 4c. Describe historic life history strategies used by spring chinook in the Willamette Basin. Data will come primarily from the literature. Life history studies specific to spring chinook salmon in the Willamette Basin date back to 1946 (Mattson 1948), prior to construction of most dams and successful hatchery programs.

Task 4d. Compare current life histories and habitats with historic (healthy) life histories and habitats to identify factors that may be limiting production. The analysis in this task will largely be descriptive because it is unlikely that historic data will be quantitative enough to compare directly to current life history/habitat data. A critical assumption is that historic habitat and the life history strategies that made use of those habitats can be adequately represented. Information for this task comes from all other tasks in this proposal.

Task 4e. Recommend prescriptive treatments that can be used to correct or circumvent habitat/environmental limitations. Prescriptive treatments will have to recognize biological and social constraints in the McKenzie Watershed. The goal of this task is not to return the McKenzie to its pristine, historic state nor is it to just maintain the status quo. The identification of plausible treatments in the watershed will need to be a collaborative process with the descriptive analysis in Task 4d providing the context for discussion. A working group composed of representatives of the McKenzie Watershed Council, fish and wildlife managers, land managers, dam operators and others will be necessary to help identify real constraints in the basin and to formulate workable changes to improve spring chinook salmon production in the basin.

f. Facilities and equipment. Office space is available in Corvallis at the ODFW Research Laboratory and in Springfield at the ODFW district office. Permanent staff for this project are currently stationed at the Corvallis lab. The Corvallis laboratory houses about 40 permanent ODFW staff. Seasonal personnel will be stationed either in Corvallis or Springfield depending on sampling schedules. Permanent staff on the project each have high-end Pentium computers for data analysis, GIS, and report writing. Several other computers are available for data input by seasonal workers. Copiers, fax, mail, and secretarial services are available at both the Corvallis and Springfield offices. There will be no charge to BPA for office space under this contract.

The Corvallis Research Lab has the capability for sophisticated work with Geographic Information Systems. A network of thirty computers integrate projects that specialize in aquatic habitat inventories, spawning ground surveys, salmonid habitat projects, and life history studies. Several of the machines have site licenses for PC-based ARC-VIEW software and a Sun Workstation provides data input via Unix-based ARC-INFO software. The Corvallis Lab network is linked to the Quantitative Sciences Group at the Forest Sciences Lab at Oregon State University, which maintains extensive GIS overlays. Permanent staff on the project have had training in the use of GIS software. No extra costs to BPA are anticipated for this work.

Vehicles for the project will be obtained from State of Oregon motor pools as is normally done for ODFW vehicles. We anticipate the need for 1 pickup for each year of the study and another seasonally depending on sampling workload.

A 20 ft. jet sled with trailer is needed for sampling juveniles (Tasks 1c, 1d, and 2b) in the lower McKenzie and Willamette Rivers near the confluence of the McKenzie. Because this project meshes closely with existing studies of spring chinook in the Willamette and Sandy basins, only the boat is needed. If this study is funded, ODFW will furnish a new 150 hp outboard with jet unit for the sled. This is a first-year, one-time cost.

Two screw traps (EG Solutions) will need to be purchased to capture migrating spring chinook juveniles in the lower McKenzie and in the Willamette River near Corvallis (Tasks 1d, 2a, 2b). These traps are state-of-the-art for portable fish traps and currently are being used by most studies where migrating fish need to be collected. These traps are in operation throughout the US and Alaska. Permanent staff on this project have had extensive experience setting up and fishing these traps. This is a first year, one time cost.

A portable pit tagging station is needed to pit tag 7,000 fish each for 3 years of the study. The unit eliminates potential recording error by scanning pit tag numbers on each fish tagged and automatically enters that into a database. The unit also allows for entering other data such as length and scale number for each tagged fish.

Two hand-held pit tag detectors are needed to recover tag information from fish recaptured at various locations in the McKenzie and Willamette rivers. A pit tag detector is already in place at the Sullivan Plant bypass trap at Willamette Falls.

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Section 8. Relationships to other projects

This proposed BPA research project is an unfunded segment identified in a broader research study by ODFW of wild spring chinook salmon in the Willamette and Sandy basins (Grimes et al. 1996 and Lindsay et al. 1997). The ODFW study was initiated in spring 1996 with the goal of developing management strategies that protect the genetic integrity of natural populations while maintaining sport and commercial fisheries on hatchery chinook. Objectives currently funded include: describing the genetic structure of sub-basin populations in the Willamette and Sandy basins; estimating the proportion of hatchery fish in wild populations; evaluating the feasibility of selective fisheries that target hatchery fish; and looking at ways of reducing interactions between hatchery and wild fish in spawning areas. In general, this work concentrates on reducing the risks of hatchery and harvest programs on wild chinook throughout the basin including the McKenzie, but does not address habitat. The proposed BPA segment would compliment the ODFW study by dealing with habitat issues in the McKenzie, the most important wild spring chinook tributary in the Willamette Basin.

Because of the close relationship between the ODFW study and that proposed for funding by BPA, ODFW permanent staff on the Willamette/Sandy spring chinook study will be responsible for the conduct of the McKenzie life history study at no cost to BPA. This includes developing annual sampling plans, supervising seasonal personnel, participating in data collection, data analysis, and reporting. Costs to BPA include only seasonal time, and equipment and supplies.

This research will be coordinated and integrated with two other projects proposed for BPA FY99 funding: 1) McKenzie Focus Watershed Coordination, and 2) McKenzie Watershed Habitat Assessment and Project Prioritization.

Section 9. Key personnel

John Runyon, the McKenzie Watershed Coordinator, will be responsible for coordinating this project with personnel at the Oregon Department of Fish and Wildlife and will provide the key link to the Watershed Council and the fish and habitat managers in the watershed. Mr. Runyon is has been employed as the Council Coordinator since March 1997 and his duties include coordinated project planning and management. Mr. Runyon has considerable expertise in planning and managing complex ecosystem research, assessment, and monitoring projects.

Robert B. Lindsay, Oregon Department of Fish and Wildlife, Research Section, will be the project leader (Natural Resource Specialist 3) for this study. Two permanent, assistant project leaders, R. Kirk Schroeder, and Ken R. Kenaston (NRS 2's), will also be involved in this study. Mr. Lindsay will be responsible for all phases of the study including coordination (McKenzie Watershed Council, fish and land managers, and private landowners), project planning, annual sampling schedules, field sampling, supervision, data analysis, and reporting. Mr. Lindsay has been a project leader on a variety of large field research projects for ODFW for the past 18 years.

ROBERT B. LINDSAY
Willamette Basin Spring Chinook Project Leader

EDUCATION
M.S., Fisheries Science, Oregon State University, 1974
B.S., Wildlife Science, Oregon State University, 1970

CURRENT POSITION AND DUTIES
Project Leader, Willamette and Sandy Basins Spring Chinook Research Study
Responsible for conduct of the study including the preparation of the overall study proposal, annual sampling plans, coordination, supervision, data analysis, reporting, and budget control.

EMPLOYMENT HISTORY
Research Project Leader (NRS-3), ODFW, Corvallis-- Willamette and Sandy Basins spring chinook study. 5/96 to present.
Research Project Leader (FWB-3),ODFW, Corvallis-- Coastal winter steelhead studies. 1/87 to 4/96.
Research Project Leader (FWB-3),ODFW, Madras-- Wild Spring chinook studies in the

John Day River. Studies of wild spring chinook, fall chinook, summer steelhead, and rainbow trout in the lower Deschutes River. Studies to improve survival of hatchery spring chinook at Round Butte Hatchery on the Deschutes. 8/80 to 12/86.
Research Assistant Project Leader (FWB-2), ODFW, John Day-- Studies of wild spring chinook in the John Day River system. 4/78 to 8/80.
Research Assistant Project Leader (FWB-2), ODFW, Corvallis-- Odell Lake kokanee research study. 4/74 to 4/78.

EXPERTISE
Mr. Lindsay has extensive experience in planning and preparing project proposals, and carrying out large field research studies on wild and hatchery salmonids. The projects he has managed are often multifaceted and cover broad geographical areas. He is familiar with a variety of sampling techniques and solutions to complex sampling problems. He also has experience in experimental design, data analyses, budget tracking, coordination, and preparation of annual progress and final reports.

SELECTED RECENT PUBLICATIONS / DOCUMENTS
Lindsay, R.B., K.R. Kenaston, R.K. Schroeder, J.T. Grimes, M.G. Wade, K. Homolka, and L. Borgerson. 1997. Willamette spring chinook salmon. Oregon Department of Fish and Wildlife, Fish Research Project F-163-R-01, Annual Progress Report, Portland.

Lindsay R.B., K.R. Kenaston, and R.K. Schroeder. 1997. Steelhead production factors. Oregon Department of Fish and Wildlife, Fish Research Project F-120-R, Final Project Report, Portland (in prep).

Lindsay, R.B., B.C. Jonasson, R.K. Schroeder, and B.C. Cates. 1989. Spring chinook salmon in the Deschutes River. Oregon Department of Fish and Wildlife, Information Reports (Fish) 89-4.

Jonasson, B.C. and R.B. Lindsay. 1988. Fall chinook salmon in the Deschutes River, Oregon. Oregon Department of Fish and Wildlife, Information Reports (Fish) 88-6.

Lindsay, R.B., W.J. Knox, M.W. Flesher, B.J. Smith, E.A. Olsen, and L.S. Lutz. 1985. Wild spring chinook salmon in the John Day River system. Oregon Department of Fish and Wildlife, Fish Research Project DE-A179-83BP397996, BPA Final Report, Portland.

JOHN R. RUNYON
McKenzie Focus Watershed Coordinator

EDUCATION
M.S., Forest Ecology, Oregon State University, 1992
M.S., Political Science, University of Oregon, Eugene, 1988
B.S., Environmental Biology, Oregon State University, Corvallis, 1983

CURRENT POSITION AND DUTIES
Coordinator, McKenzie Focus Watershed
Responsible for overall project management and coordination for the McKenzie Watershed Council. Duties include project planning, coordinated implementation, and monitoring; proposal preparation; fiscal management; public outreach and communication of council activities.

EMPLOYMENT HISTORY
Watershed Analysis Consultant, Corvallis, OR, 5/95 to 5/97
Senior Scientist, Dynamac, Inc., and ManTech Environmental Technology, Inc., research contractor for the US Environmental Protection Agency, Corvallis, OR, 5/95 to 7/96
Resource Monitoring Coordinator, Oregon Dept. of Forestry, Salem, OR, 7/92 to 5/95
Faculty Research Assistant, Forest Science Dept., Ore. St. Univ., 7/90 to 7/92

EXPERTISE
Mr. Runyon has expertise in planning and managing complex ecosystem research, assessment and monitoring projects. Mr. Runyon has experience in projects involving environmental policy, watershed analysis at a range of scales, research on forest remote sensing, riparian assessments, monitoring water quality and stream enhancement structures, and analysis of forest practices regulations.

SELECTED RECENT PUBLICATIONS / DOCUMENTS
Runyon, J.R. and K. Mattson. 1997. ***Stream Habitat, Riparian and Fish Use Survey Summaries for Selected Streams in the Siuslaw, Alsea and Nestucca River Basins***, Final Report for the Siuslaw National Forest, Corvallis, OR.

Runyon, J.R., C. Andrus, and K. Mattson. 1996. ***Mercer / Berry Watershed Analysis***, Final Report for the Siuslaw National Forest, Corvallis, OR.

Runyon, J.R. 1995. ***Monitoring Forest Stream Enhancement Projects***. Oregon Departments of Forestry and Fish and Wildlife, Salem, OR.

Runyon, J.R., R.H. Waring, S.N. Goward, and J. Welles. 1994. ***Environmental limits on net primary productivity and light-use efficiency across the Oregon transect***. *Ecological Applications* 4: 226-237.

Runyon, J.R. 1994. ***Forest Practices Monitoring Program Strategic Plan***. Oregon Department of Forestry, Salem, OR.

Section 10. Information/technology transfer
The primary, formal means of information transfer will be annual progress reports with interim recommendations. Final reports with recommendations also will be completed for each of the two phases of the study. In addition, a project oversight committee with representation from the McKenzie Watershed Council, fish and land managers, and dam operators will be formed to provide coordination, information transfer, and feedback.

Presentations of relevent findings will be made at project reviews held by ODFW and the Watershed Council or on request by anyone. Informal communications with the watershed council coordinator, fish and land managers, and others during the daily conduct of the study will account for a large part of the information and technology transfer.